

century a revival began, which Prof. Paulsen traces largely to the rise of the philosophical faculty from servitude as *ancilla theologiae* to the leadership, though it doubtless corresponded with the awakening of the general intellectual life of the country inaugurated by Klopstock and Lessing.

But the old freedom of the universities in Germany was necessarily never revived in its completion, and the position of the university as a State institution dependent to a large degree in its internal administration on the Government of the country in which it is situated leads to anomalies even now which Englishmen will not readily understand, though the real interference with freedom may be less than it seems. Thus the government of the university, even extending to the syllabus of studies in a particular faculty, is potentially, and sometimes actually, under the control of a Minister of Education, while the ordinary professors are appointed by the Sovereign of their country and the extraordinary by the Minister of Education, and it appears from the statistics quoted by Prof. Paulsen that in a fair proportion of cases the appointment runs counter to the recommendation of the faculties; but our author, ever determined to see both sides of a question, remarks that political and Court intrigues tend to efface the back-stairs politics of the faculties, so that in the end the right man is usually chosen.

It follows also from the dependency of the universities on the State that the teachers must hold cautious political views, and even Prof. Paulsen has nothing at all to say in favour of the Prussian Ministry which dismissed a privatdocent of physics from his post on the sole ground that he was a social democrat.

To choose one more point from a book absorbing throughout in interest, it is instructive to note that the absence of all social life such as is enjoyed at the old English universities does not cause that complete satisfaction which opponents of the system are so keen to insist on, but in several instances boarding-houses are being instituted where students can live in common. In the Middle Ages the residential collegiate system was, of course, universal, and a few colleges were retained long after the system had died out on the Continent for the benefit of the poorer students. It can hardly be held that the collegiate system persisted in England for the same purpose.

We may sketch the plan of Prof. Paulsen's work as follows:—in the first book we are given an outline of the historical development of the universities from the Middle Ages down to modern times, and probably nowhere else can so much be learnt on this subject within the compass of about seventy pages; the succeeding books are concerned with present-day conditions, the second treating of the relation of the university to the State, to society, and to the Church, the third dealing with university teachers and the methods of instruction, the fourth with university life from the student's point of view. In the fifth book some special problems connected with the several faculties of theology, law, medicine, and philosophy are discussed.

G. S.

GEODESY IN THE SCHOOLS.

Text-Book on Geodesy and Least Squares Prepared for the Use of Civil Engineering Students. By Prof. Charles L. Crandall. Pp. x+329. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1907.) Price 12s. 6d. net.

SUCH a treatise offers little scope for originality of treatment or of design. The problems connected with triangulation, or with measurement, or with levelling have been considered too frequently and too minutely by experts to permit the introduction of novelty. Similarly in the application of the results of measurement to the discussion of the figure of the earth, the author must follow beaten paths and occupy ground that has been thoroughly surveyed. His opportunity for exhibiting independence lies rather in the judicious selection of materials, and particularly in determining what should be omitted, that is to say, in considering the requirements of those for whom he is writing. Prof. Crandall is addressing himself primarily to students of Cornell University, and presumably to those who are beginning the study of the subject and not to professional men engaged in actual work.

For a text-book to be used by beginners it might be objected that the author has a little overlaid his treatise with a superfluity of detail. The increased attention given in university training to the study of geodesical problems and the determination of the coordinates of a station on the earth's surface is a feature that should be welcomed and encouraged. On many grounds it may be urged that the use of instruments in the field is an admirable training, more especially as it affords opportunities for the application of those formulæ which have been acquired from bookwork. For this reason one could defend the somewhat lengthy description of instruments here given, their adjustment and method of use, the determination of corrections, &c., though at times the author is tempted to indulge in too great detail. This error, if it be an error, arises from following too closely the reports and data furnished from the offices of the Coast Survey. The danger to be feared is that the minute care and attention to detail necessary in operations extending over a large area, may tend to make the subject repellent to a student whose main object is to gain an intelligent insight into the processes involved. But a greater fault appears to be one of omission. There is too little, almost nothing, concerning the methods of deriving the latitude and longitude of a station. And surely such matters are of quite equal importance with the measurement of a base line, and fall as decidedly within the compass of such a work. To be able to determine one's position on the earth involves something more practical than a mere college exercise. It is information that is frequently needed and may become a matter of great importance.

The first few chapters of the book are mainly occupied with the description of the use and adjustment of instruments in the field. The next three are devoted to consideration of problems connected with

the figure of the Earth. The mathematical ingenuity exhibited may be interesting, but is familiar. In the form and to the extent in which the several problems are discussed, these chapters scarcely belong to a practical treatise, and do not afford the means of applying the facts that the student has himself derived from the use of instruments.

In the second part, which consists of three chapters, the author serves up the standing dish of least squares. So far as theory is concerned he has followed Chauvenet, and for the practical application to triangulation and conditioned problems the admirable treatise of Wright and Hayford on "The Adjustment of Observations" (see *NATURE*, vol. lxxiv., p. 148). The book is well illustrated, and there are some useful tables and information given in an appendix, though we scarcely understand the principles upon which the formulæ have been selected. The information throughout is conveyed in a clear and lucid manner, but a little unevenness is sometimes noticeable, as though the author were uncertain of the degree of thoroughness with which the several topics should be treated.

AN AMERICAN TEXT-BOOK OF ENTOMOLOGY.

Entomology, with Special Reference to its Biological and Economic Aspects. By Dr. J. W. Folsom. Pp. vi+485; illustrated. (London: Rebman, Ltd., 1906.) Price 14s. net.

A WORK treating of entomology purely from the bionomic and economic standpoints is a distinct and long-felt want, but it cannot be said that the book under review supplies that want adequately, in spite of its title and a statement in the preface that it "was written in an effort to meet a growing demand for a biological treatment of entomology."

With such admirable and detailed manuals of insect anatomy as Packard's "Text-book of Entomology" and Henneguy's "Les Insectes" already in the field, Dr. Folsom could have safely avoided a treatment of this subject; as it is, his second chapter, entitled "Anatomy and Physiology," occupies nearly one-third of the book, and yet fails to attain the comprehensiveness of the afore-mentioned manuals. Chapter vii., on the origin of adaptations and of species, might well have been omitted, for it contains nothing that is new and little that is not almost common knowledge; curiously enough, though de Vries's work is discussed, there is no mention of Mendel or his followers.

The inevitable result of these two unnecessary chapters is an unfortunate brevity of treatment in the more useful and interesting sections of the book, and many important phenomena and facts are crowded out altogether. The author may claim (as he does) that his work is "concise," but hardly that it is "comprehensive," since there is no mention of the life-history of Mantidæ, of the eggs of Phasmidæ, of fig-insects, of the cuckoo-spit, of the formation of stick-lac, of the remarkable symbiosis of Acari and

bees of the genus *Koptorthosoma*, of the extraordinary beetles *Mormolyce* and *Hypocephalus*. The accounts of parthenogenesis, of phosphorescent insects, and of aquatic insects are lamentably brief, and nothing at all is said of the insects found in caves.

Chapter ix., on insects in relation to other animals, is one of the best in the book; Dr. S. A. Forbes's admirable reports on the insect food of birds and fishes have been largely drawn upon, and deserve the attention directed to them. We have not noticed many errors, but the following need correction in a later edition:—*Paraponyx* is not the only lepidopterous genus with truly aquatic larvæ (p. 184); *parakleta* should be *paralekta* (p. 216); it is at least doubtful if the mimicry of bees and wasps by species of the genus *Volucella* can be classed under the heading of aggressive mimicry; it is far more probable that the flies secure immunity from the attacks of vertebrate foes by their resemblance to stinging insects than that this resemblance enables them to enter unobserved the nests of hosts who are quick enough to resist the intrusion of strangers of their own species (p. 235); the blood-parasite conveyed by *Glossina morsitans* is not similar to the malarial parasite (p. 306). The tsetse-fly is cited as the carrier of the blood-parasite in nagana disease, but not of the organism causing sleeping sickness. In the anatomical chapter some reference should be made to the fact that the stomodæal and proctodæal sections of the alimentary canal are lined with chitin, whilst the mesenteron, being of endodermal origin, is not.

The numerous text figures are for the most part excellent, and a goodly proportion are original; special attention may be directed to Figs. 242 and 260; the latter, if a genuine record of an actual occurrence, is a triumph of nature-photography; Fig. 244, illustrating protective mimicry, is unfortunate, for it represents *Eristalis tenax* mimicking a stingless drone-bee. The coloured frontispiece is not only a poor example of what can be done in these days of improved methods of chromolithography and three-colour photography, but also abounds in errors, e.g. Fig. 1, labelled *Heliconius eucrate*, is *Lycorea halia*; Fig. 4 is not *Mechanitis lysimnia*, but *Melinaea ethra*; Fig. 5 is not *Papilio merope* ♂ from South Africa, but *Papilio antinorii* ♀ from Abyssinia; Fig. 8 is *Amauris echeria* from West Africa, not from South Africa; Fig. 10 is not really like any butterfly known to science, but it apparently represents *Papilio merope*, ♀ form *cenea*, though it is labelled *Amauris echeria*, the "model" of the *Papilio* mimic; Fig. 11, labelled *Papilio merope* ♀, is apparently *P. echerioides* ♀. This gives a total of six errors in eleven figures! It is evident that the author has reproduced the errors occurring in the plates illustrating Weismann's "Evolution Theory," and it is a pity that, in the case of the African butterflies at any rate, he did not consult Trimen's classical paper or the frontispiece to Poulton's "Colours of Animals."

A useful bibliography and a trustworthy and comprehensive index conclude the work. R. S.